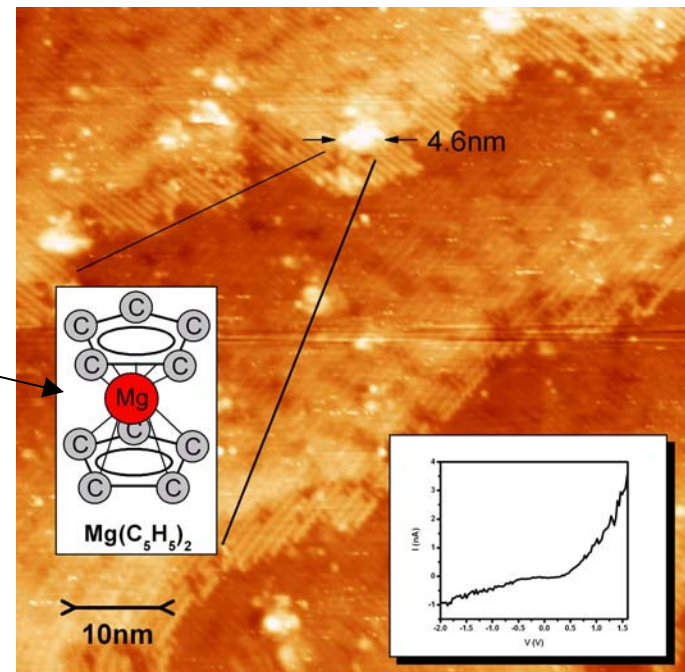
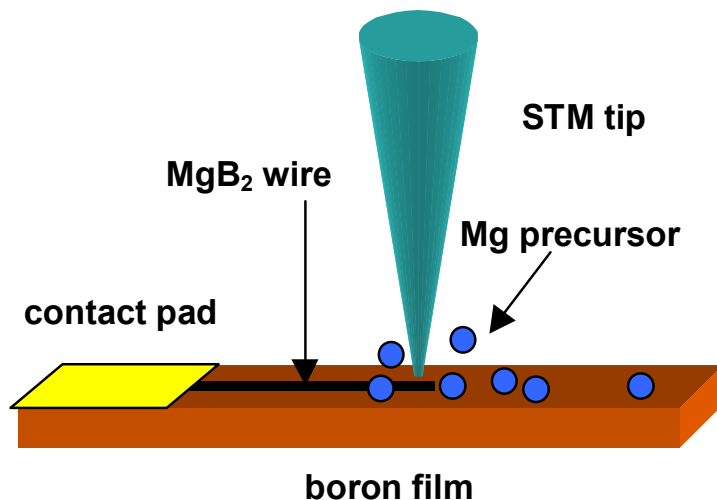


Fabrication of MgB_2 Quantum Devices

Russell Giannetta, Alexey Bezryadin

(U. of Illinois at Urbana-Champaign) NER grant, ECS-0210447

MgB_2 is a 39 Kelvin superconductor with excellent properties for nanoscale electronics. We are studying ways to grow MgB_2 nanostructures by using a scanning tunneling microscope tip to induce the chemical reaction between boron and a magnesium precursor molecule. The white spots in the STM image correspond to this precursor, whose current-voltage “spectrum” is also shown. The experiment explores new ways to induce chemical reactions at the nanoscale as well as basic questions in molecular electronics.



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Education

This work has involved one graduate student, Tyson Olheiser. Along with learning to perform ultrahigh vacuum STM measurements, he has developed skills in film growth, fabrication with focused ion beams, and low noise measurement techniques. A second graduate student, Sophia Sun Jingze worked during the summer of 2003 to understand the current voltage characteristics obtained from the STM work.

Outreach

During the summer of 2003 , Evan Kereiakes, a sophomore at the U. Illinois, worked in the lab to develop better computer data acquisition programs for the experiment. In addition, each year I serve as a judge and advisor for the University of Illinois Engineering Open House - a campus wide competition of independent physics, computer science and engineering projects which is open to the public for two days.